

**REMARKS**

Claims 6-9, 11, and 15-20 were examined in the most recent, non-final office action, dated October 12, 2006. The drawings stand objected to, and all claims stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. All claims stand further rejected as either anticipated under 35 U.S.C. §§ 102(b), 102(e) or obvious under 35 U.S.C. § 103(a) over one or more of Mitchell, WO90/00105; Hirata, U.S. Patent Publication No. 2003/0003858; Yoshida, U.S. Patent No. 6,533,650; and Carpentier, U.S. Patent No. 6,287,184. Based on the amendments and remarks made herein, applicant respectfully requests issuance of a Notice of Allowance.

**The Drawings Show Every Feature of the Claimed Invention**

Applicant respectfully traverses the objection to the drawings for allegedly failing to show the claimed decreasing gaps toward the outer diameter recited in claim 8. The examiner's attention is respectfully directed to Figure 4, which shows the features recited in claim 8. For example, the gaps between the triangular groups of diamond grains closest the center are greater than the gaps between the triangular groups of diamond grains near the outer circumference. See also specification, page 17, second full paragraph. Withdrawal of the objection to the drawings is respectfully requested.

**All Claims Comply with 35 U.S.C. § 112, second paragraph**

As amended, all claims are now definite. "The test for definiteness under 35 U.S.C. § 112, second paragraph is whether those skilled in the art would understand what is claimed when the claim is read in light of the specification." MPEP § 2173.02.

Claim 6 stands rejected because the office asserts that the claim term “diamond group units [being] oriented in different directions” is indefinite because the claim does not recite what the different directions are with respect to. Claim 6 has been amended to recite that the diamond group units are oriented in different directions with respect to a rotational direction of the disc on the disc surface. Accordingly, claim 6 is not indefinite.

Claim 7 stands rejected because the office asserts that the claim term “swirl shape” is indefinite. As mentioned above, claims must be read in light of the specification. Here, the specification informs one of ordinary skill what is meant by the claim term “swirl shape.” The examiner’s attention is directed to the page 14, line 13 – page 15, line 11 of the specification. The specification states that “[t]he gaps 7 extending continuously are, as shown by gaps indicated by adjacent broken lines (imaginary reference lines) in FIG. 3, such that inner diameter ends 7a are located forward and outer diameter ends 7b are located backward in the rotational direction and extend obliquely and are curved to be rounded from the inner diameter ends 7a to the outer diameter ends 7b as seen in a front view. The gap 7 extends continuously in a **swirl shape** in such a manner that an outer diameter end portion of the gap 7 deviates from an inner diameter end portion of the gap 7 by a predetermined angle  $\alpha$  in the rotational direction (see FIG. 3, approximately 20 degrees in this embodiment). The predetermined angle  $\alpha$  may alternatively be 20 degrees or larger.” (emphasis added). See also page 17, lines 4-8 of the specification. Withdrawal of the rejection to claim 7 is respectfully requested.

Claim 8 stands rejected because the office asserts that it is unclear where the gap is. Claim 8 has been amended to clarify that the gap is between adjacent diamond units. The office further asks, “where does the gap begin?”, and further “how does the gap decrease?” Claim 8 now recites that “gaps between adjacent diamond group units on the disc surface

thereof gradually decrease toward the outer diameter of the grinding portion.” A first example of this can be seen in Fig. 3 depicting a gap 7 wherein the width of the gap at 7a is decreased relative to the width of the gap at 7b. Thus, using the examiner’s parlance, the gap 7 ‘begins’ at the ring 5, and ‘ends’ at the outer peripheral edge 6. However, in this example; the gap increases toward the outer diameter. In contrast, the examiner’s attention is directed to Fig. 4, which shows the gap between adjacent diamond group units A greater near inner ring 5 as compared to outer peripheral surface 6. The specification describes, “In addition, the gap between the diamond group units A (gap between adjacent diamond group units A which are located forward and rearward on the swirl reference line 17) gradually decreases as it is closer to the disc outer peripheral edge 6 to increase density of the diamond grains 2 in the vicinity of the disc outer peripheral edge 6.” Specification, page 17, second full paragraph,.

Claim 11 stands rejected because the relations between the center region, the center side region, the peripheral side region, and the peripheral edge regions is unclear, and the office further alleged that it was unclear as to where the diamonds are attached. Claim 11 has been amended to clarify the locations of the cited regions on the disc surface.

The specification further adequately informs one of ordinary skill in the art what a character or graphic in a pointillist manner is. See, e.g., Fig. 6, reference numeral 27. Pointillism is known as applying small points or dots to a surface to form a recognizable image. See [www.m-w.com](http://www.m-w.com). Here, an example of pointillism is shown in Fig. 6, where the diamond grains are applied to the surface of the disc and adequately form characters such as the manufacturer’s name.

Claims 15 and 16 stand rejected because it is allegedly unclear if the protruding portion protrudes both forwardly and backwardly. Claims 15 and 16 have been amended to clarify that the protruding portions protrude both forwardly and backwardly.

Claims 17 and 20 stand rejected because it is allegedly unclear what constitutes the outer peripheral edge. Claims 17 and 20 have been amended to recite that an outer surface of the protruding portion is rounded in a cross-sectional view.

Withdrawal of all rejections based on indefiniteness is respectfully requested.

Claim 6 is Allowable.

Applicant respectfully traverses the rejection to claim 6, as amended, as anticipated by each of Hirata, Yoshida, and Mitchell. Claim 6 recites, in part, adjacent diamond grains form diamond group units, and the diamond group units are oriented in different directions with respect to a rotational direction of the disc on the disc surface in a front view. Support for claim 6 can be seen in, for example, Fig. 4, where the exemplary diamond group units form triangles, and in the circumferential outer rings, the triangles alternate between being 'upside down' and 'right-side up.'

The Office asserts that Hirata discloses, in Fig. 8, orientation in different directions. Hirata discloses super-abrasive layers 410 that are symmetric with respect to the rotational direction of the disc. In other words, with respect to the rotational direction of the disc, each of the layers 410 is oriented in exactly the same way. Hirata fails to disclose that the layers 410 are oriented in different directions with respect to the rotational direction as recited in claim 1.

The Office likewise asserts that Fig. 1 of Yoshida discloses orientation in different directions. Fig. 1 discloses a disc with grains 2 that are more densely concentrated near the outer edge 8. First, the grains do not form group units as recited, and, of course, Yoshida fails to disclose any group units that are oriented in different directions with respect to the rotational direction of the disc.

Finally, the Office asserts that Mitchell discloses diamond group units oriented on a disc in different directions. Mitchell discloses groups shaped in a triangle in Fig. 5b.

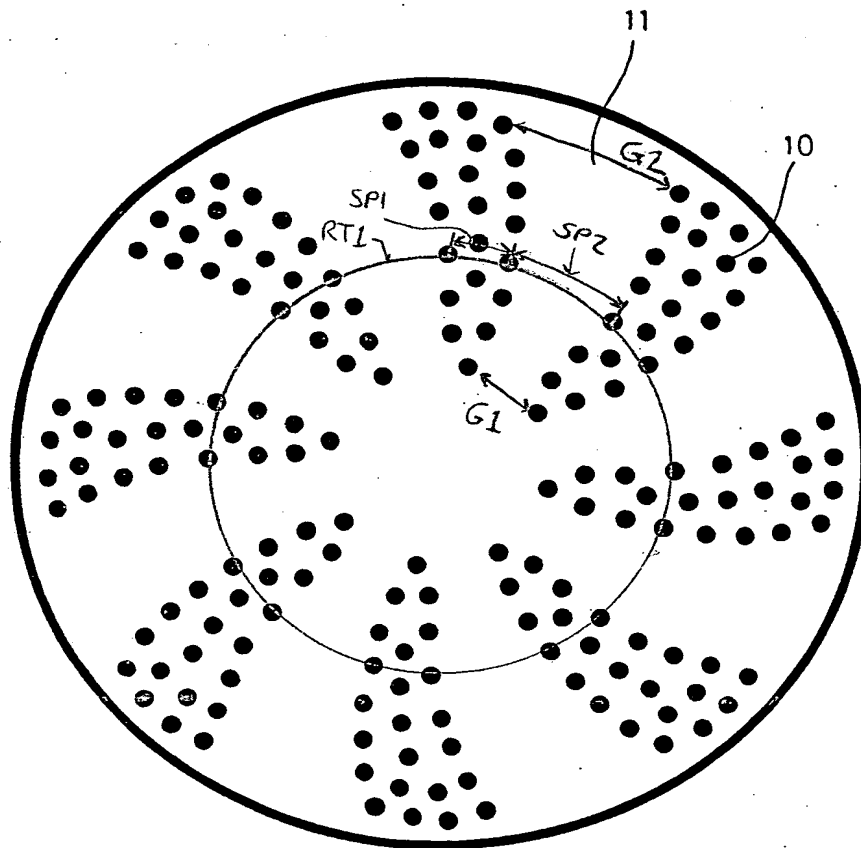
However, Mitchell discloses that these groups are disposed on a belt. “Experiments were conducted with belts having the deposit patterns shown in Figures 5a to 5e.” Mitchell, page 7, lines 21-22. Because a belt travels linearly, these triangle-shaped groups are all oriented in the same direction of the linear travel. Thus, the belt-driven groups fail to be oriented in different directions with respect to the direction of travel.

While Fig. 7 discloses a disc with “shaped segments” 10 with a plurality of individual deposits (the black circles), Mitchell fails to disclose what the individual deposits are. Even if the one can interpret the shaped segments to include the diamond shaped groups of Fig. 5b, there is absolutely no disclosure of how the diamond shaped groups would be oriented within the shaped segments. Because the groups of Fig. 5b are all oriented in the same direction of travel for the belt, one of ordinary skill in the art would understand that the diamond groups should be oriented likewise with respect to the rotational direction of travel for the disc. Accordingly, none of the cite references disclose or suggest to orient diamond group units in different directions with respect to a rotational direction of the disc. Applicants respectfully request allowance of claim 6.

Claim 7 is Allowable.

Applicant respectfully traverses the rejection to claim 7 as anticipated by each of Mitchell, Hirata, and Yoshida. Claim 7 recites that a plurality of adjacent diamond grains are patterned in a predetermined configuration to form diamond group units which are arranged regularly on the grinding portion about their respective rotational tracks, and the diamond group units are arranged continuously in a swirl shape.

Mitchell, in Fig. 7, discloses shaped segments 10 comprised of a plurality of individual deposits (unnumbered). However, the deposits are not arranged regularly about their respective rotational tracks. In each rotational track of Fig. 7, the deposits are spaced very close together within the shaped segment, and then there is a section of no deposit between the shaped segments. For example, as shown below, rotational track RT1 has deposits defining spaces SP1 and SP2. SP1 and SP2 have different lengths, and therefore the deposits are not arranged regularly about the rotational track RT1 as is recited in claim 1.

*Fig. 7*

This is in contrast to the example shown in Fig. 3 of the present application. Fig. 3 shows diamond grains 2 that are consistently spaced between each other on each rotational track. See, for example, rotational tracks a, b, and c. Thus, the disc recited in claim 7 forms a swirl shape where the groups are arranged regularly about their respective rotational tracks. Mitchell fails to disclose or suggest the recited construction.

The Office cited Fig. 3 for Hirata and Fig. 1 for Yoshida as disclosing a swirl shape. While Hirata shows superabrasives 210 disposed regularly about a rotational track, those superabrasives fail to form a swirl shape as recited in the claims and as defined in the specification. Fig. 1 of Yoshida fails completely to disclose a swirl shape of diamond grains.

Because no reference discloses or suggests the features recited in claim 7, claim 7 is allowable.

Claims 8 and 9 are Allowable.

Applicants respectfully traverse the rejection to claim 8 as anticipated by each of Mitchell and Hirata. Claim 8 recites, in part, the diamond group units are arranged in such a manner that gaps between adjacent diamond group units on the disc surface thereof gradually decrease toward the outer diameter end of the grinding portion.

Mitchell, on the other hand, discloses deposits where some gaps between adjacent deposits increase toward the outer diameter end of the grinding portion. For example, as shown above in Figure 7, gap G1 between the inner most deposits is much smaller than gap G2. In other words, this gap increases toward the outer diameter of the grinding portion. Accordingly, this is in direct opposition to the features recited in claim 8.

The office alleges that Fig. 4 of Hirata discloses gaps that decrease toward the outer edge. Hirata only discloses superabrasives at the outer edge. It fails to disclose any group units in from the outer edge, and therefore fails to disclose gaps that decrease toward the outer diameter end. Accordingly, claim 8 is now allowable. Dependent claim 9 is allowable for at least the same reasons.

Claim 11 is Allowable.

Applicants traverse the rejection to claim 11, as amended, as obvious over any of Mitchell, Hirata, and Yoshida in view of Carpentier. Claim 11 recites, in part, that the region of the disc surface to which the plurality of diamond grains are bound includes the center side region and the peripheral side region, and the diamond grains are arranged to form a character or a graphic drawn in a pointillist manner in the center side region.

The Office admits that none of Mitchell, Hirata, and Yoshida disclose a character or a graphic, and relies on Carpentier for this element. However, Carpentier fails to disclose or suggest that the character is drawn in a pointillist manner, and further fails to locate the character in the center side region. Carpentier discloses that the character is formed by removing abrasive particles. Accordingly, Carpentier discloses the inverse of a character formed in a pointillist manner, and therefore fails to disclose a pointillist manner to form a character.

Further, the method of Carpentier could not be used with the diamond grinding disc of claim 11, and therefore there is no suggestion to add Carpentier to the disclosure of any of the aforementioned references. As taught by Mitchell, a diamond grinding disc generally employs a relatively sparse covering of diamond deposits. This is in contrast to the disclosed



abrasive of Carpentier. In a relatively sparse covering, removing diamond deposits would not be able to form a character.

Furthermore, the claim recites that the character is disposed in the center side region. Carpentier fails to disclose the location of the character relative to the surface of the disc. In contrast, this application notes the importance of locating the characters. "Further, by arranging the character or the like at a proper position, the diamond disc thus constructed exhibits grinding performance substantially as high as that of the conventional diamond disc." Specification, page 9, lines 1-4. Therefore, locating the character at the claimed location ensures that the performance of the grinding disc is not substantially degraded. Accordingly, the Office's argument that "the placement of the image or graphic would have been an obvious design choice" is incorrect. The placement of the character as claimed is based on the inventor's recognition that performance of the grinding disc is not lessened substantially when the character is placed in the claimed location.

Allowance of claim 11 is respectfully requested.

Claims 15-20 are Allowable.

Applicants respectfully traverse the rejection to claims 15 and 16 as anticipated by each of Yoshida and Hirata. Both claims 15 and 16 recite, in part, a protruding portion formed at a peripheral edge of the grinding diamond disc, the protruding portion protruding both forward and backward relative to the disc surface. Claim 15 recites that the diamond grains are bound on the protruding portion. Claim 16 recites that the diamond grains are bound on the protruding portion intermittently.

The Office alleges that Hirata shows a protruding portion in Figs. 2 and 6. However, Hirata only discloses that the asserted protruding portion protrudes forwardly relative to the

disc surface, and not backwardly as recited in the claims. Further, Yoshida fails to disclose any protruding portion at the outer peripheral edge of the disc, much less a portion protruding both forwardly and backwardly.

As one example is described in the specification, "the outer peripheral region of the back surface of the disc may form a rounded surface with protrudes backward. Such a diamond disc efficiently performs cutting in a limited sense." Specification, page 10, second full paragraph. None of the cited references recognize this feature added by the protruding portion, and therefore none suggest a protruding portion. Accordingly, claims 15 and 16 are allowable over the art of record. Dependent claims 17-20 are allowable for at least the same reasons.

#### CONCLUSION

In view of this response, Applicants submit the pending application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite prosecution of the subject application, the Examiner is invited to call the undersigned attorney. Applicants believe no fee is due with this response. However, if any fee is due, please charge our Deposit Account No. 13-2855, under Order No. 19036/41175, from which the undersigned is authorized to draw.

Dated: February 9, 2007

Respectfully submitted,

  
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